Canada Mortgage and Housing Corporation

Société canadienne d'hypothèques et de logement

CMHC Helping to house Canadians

# An Examination of the Census and HFE Need for Repair Questions for the 1991 Census

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## 1.0 INTRODUCTION

Accurately measuring physical house condition at the national, provincial and community levels has been a major objective of the Canada Mortgage and Housing Corporation for the last decade. To fulfill this objective CMHC has relied upon the general public, as well as certain target populations, to provide house condition data in several major surveys. The house condition data provided by the public is used by CMHC for a number of purposes including research, program evaluation and program development and administration. Over the last decade, these repair need data have come primarily from three different sources; the 1981 Census, periodic Household Facilities and Equipment (HFE) surveys administered as supplements to the Statistics Canada Labour Force Survey, and special national surveys such as the 1986 National Housing Study and the 1985 Evaluation of the Residential Rehabilitation Assistance Program.

One of the tools used consistently to measure physical house condition in these large public surveys is a need for repair question including three response categories. Respondents are asked to assess the state of repair of their dwelling by indicating whether it is in need of major, minor or no repairs (i.e., regular maintenance only). Examples of types of repairs in each category are provided to assist the respondent in making a selection.

There are two existing versions of the three-category need for repair question. They are commonly called the Census question and the HFE question (presented in Appendix D). There are two major differences in these questions. First, the order of the categories is reversed, with the "major repair" category being presented first in the HFE version and the "no repair" category being presented first in the Census question. Secondly, the examples provided to the respondent within each category are different, being more detailed in the HFE question. The only major national application of the Census question has been the 1981 Census. All subsequent CMHC-sponsored national surveys, including the HFE surveys and the 1986 NHS, have used the HFE question.

The HFE question was developed originally because of the assumption that the Census question resulted in an underestimation of repair need. In fact, preliminary evidence had shown that the repair need estimates from occupant data from surveys using the Census question (e.g., the 1980 Ottawa Pilot of Physical House Condition and Rehabilitation Need) were systematically lower than comparable estimates from inspectors

for the same housing stock. Also, the first national applications of the HFE question generated higher estimates of major repair need than those developed from the Census question. This led to the belief that the HFE question was a successful improvement upon the Census need for repair question.

The problem with interpreting the quality of the data resulting from the two need for repair questions is that there is no evidence based on directly comparable sources of data with which to make a definitive decision. Estimates of physical house condition and need for repair from survey data can vary for a great number of reasons including differences in the stock, the question used, the format and sequencing of the survey instrument, the method of survey administration, differences in conditions at different time periods, and different study populations. Up to this point in time, evaluation of the relative quality of the data from the two questions has been a matter of speculation because no systematic attempt had been made to control for the variations attributable to these numerous factors.

The Research Division of CMHC commissioned this study to help to determine which of the two need for repair questions to recommend for inclusion in the 1991 Census. It has involved a detailed comparative analysis of the available sources of physical house condition data based on the need for repair questions. This report summarises the results of this analysis of the Census and HFE questions. In addition to comparing the validity and reliability of these two questions, this report provides broad recommendations about which version of the question is preferable for the next census.

# 2.0 METHODOLOGY

## 2.1 Overview of Data Sources

There were five main components of the methodology for this study: 1) a review of the results on need for repair from existing surveys and the Census; 2) selection of the survey data most suitable for conducting the required analyses; 3) an analysis of the validity of the results of the two questions from the selected surveys; 4) an analysis of the reliability of the results of the two questions from the selected surveys; and 5) the use of matched samples to control for differences in study populations, time periods, survey methods and in the housing stock.

The study also involved a series of steps to create and manipulate the data from the various samples used in the analysis. The analysis was based primarily on data from four separate samples. These included the 1981 Census (in fact a sample of cases completing the 2B extended questionnaire was used), the 1985 Household Facilities and Equipment Survey (HFE), the 1986 CMHC National Housing Survey, and the 1987 Newfoundland and Labrador Housing Needs Assessment (NLHNA). With the exception of the 1987 Newfoundland survey, all of these data sources involved large national samples. A summary of the characteristics of these data sources is presented in Exhibit 2.1.

Several sources of data were available for possible use in this analysis. The ones presented in Exhibit 2.1 were used for a number of reasons including: the samples represented a broad cross-section of the population; the survey data for each sample permitted analysis and comparison across a large number of household and dwelling characteristics; and these four data sources permitted the most direct comparisons between the two need for repair questions while controlling for key factors such as method of administration and time period.

**EXHIBIT 2.1**
**Summary of Data Sources**

| Data Source | Question | Number of Cases | Characteristics |
|---|---|---|---|
| 1981 Census | Census | 72,600 Homeowners<br>45,232 Tenants | o self-administered<br>o no linked inspection data<br>o extensive household and dwelling characteristics data. |
| 1985 HFE Survey | HFE | 23,384 Homeowners<br>10,878 Tenants | o primarily a telephone survey<br>o no linked inspection data<br>o detailed household and dwelling characteristics |
| 1986 National Housing Study | HFE | 8,972 Homeowners<br>2,568 Tenants<br>1,726 Inspections | o self-completed questionnaire<br>o linked inspection and occupant data<br>o detailed household and dwelling characteristics<br>o most current and complete source of data related to HFE question |
| 1987 Newfoundland and Labrador Housing Needs Assessment | Census | 1,674 Homeowners<br>333 Tenants<br>201 Inspections | o self-completed questionnaire<br>o linked inspection data<br>o comparable with 483 cases for Newfoundland from 1986 National Housing Study |

Other data sources with need for repair questions that were considered for study but not used include the 1983-84 RRAP Evaluation and the 1985 CHRP/CHOSP Evaluation (these two samples include CMHC program participants only), the 1984 Low-Rise Apartment Study for the Ontario Ministry of Municipal Affairs and Housing (an Ontario only sample), and the 1985 On-Reserve Housing Program Evaluation for Indian and Northern Affairs Canada (for households on reserve only). Overall results for the need for repair questions on the surveys conducted for these studies were examined but further analyses were not conducted. This is mainly because these studies were not based on nationally representative samples.

## 2.2 Matched Samples

Throughout the analysis we conducted tests on samples using different need for repair questions but matched on certain key characteristics such as time period, study population and method of survey administration. In fact the selection of the samples was based in part on our ability to control for factors extraneous to the actual questions because the main objective was to assess the effects of the question.

The best match was provided by the 1987 Newfoundland and Labrador Housing Needs Assessment (NLHNA) and the Newfoundland cases from the 1986 National Housing Study (NHS). These two surveys used virtually identical methods of administration, the time periods were similar and the questionnaires were also very similar. The 1987 Newfoundland survey used the Census need for repair question, however, while the 1986 CMHC survey used the HFE question. Furthermore, not only are there matched occupant samples (i.e., approximately 500 in Newfoundland for the 1986 NHS and 2,100 for the 1987 NLHNA), but there are also subsamples of inspected dwellings linked with the occupant data at the dwelling level for each survey. There are 107 such cases for the 1986 NHS and 201 for the 1987 NLHNA. With these two sources of data we could assess the effects of the question on occupant estimates of repair need and assess the relative validity of the data by comparing the responses to those of qualified inspectors.

Two other matched samples were analysed to test for the effects of differences in the need for repair question and the method of administration. The 1981 Census and the 1985 HFE samples both have a large number of cases and many comparable variables on household and dwelling characteristics. Since these two surveys used different need for repair questions, we could examine the differences in responses to each question for a number of different subgroups. The 1985 HFE survey and the 1986 NHS both used the same need for repair question (i.e., the HFE question) and were both large national samples. However, the surveys were based on different methods of administration. The 1986 NHS used a self-completed mailback questionnaire while the 1985 HFE was primarily a telephone survey. Assessing the relative validity and reliability of the two methods is important as CMHC uses the ongoing HFE surveys as inter-censal sources of need for repair data.

## 2.3 Validity Analysis

We considered the analysis of the validity of the two need for repair questions to be the most important task for this study and the most important issue for the selection of a question for the 1991 Census. Validity refers to the extent to which an item measures what it purports to measure. In other words, are the results "true"?

This analysis was concerned with criterion or predictive validity. In this type of analysis a measure is compared to a standard or criterion which is assumed to be an objective indicator of true conditions. Measures which most closely approximate the criterion measure are considered to be the most valid estimates. A necessary condition for these tests is a criterion variable which can be taken to be the objective standard.

Criterion validity tests are far more exacting than tests for other types of validity such as face validity (e.g., peer or expert review) or construct validity (i.e., in which variables should relate to one another in a logical or theoretically plausible manner). A lack of suitable data is usually the constraint for conducting this type of analysis. Fortunately two of the sources used for our analysis have data on the need for repair question provided by both the dwelling occupant and a professional inspector and which is linked at the individual house level. One survey (i.e., the 1986 CMHC NHS) used the HFE question and the other (i.e., the 1987 Newfoundland and Labrador Housing Needs Assessment) used the Census question.

Criterion validity tests were based primarily on an analysis of the degree of association, agreement and error resulting from the crosstabulation of the occupant ratings and the inspector ratings. Breakdowns by variables for key population subgroupings such as tenure, income, education and family type were also conducted. Evaluation of the results was based on the comparison of the findings for surveys using the two different questions.

## 2.4 Reliability Analysis

Reliability deals with the consistency and comparability of the data. Our particular concern was with the degree to which the three response categories of each question mean the same thing to different people. The most reliable of the two need for repair questions is the one which produces the most consistent responses from similar people in similar settings.

In the absence of a suitable standard or criterion, validity assessment is usually more difficult than reliability assessment. However in this case, reliability was the more difficult of the two key measurement issues to evaluate because there were so many possible sources of variation in the need for repair data. Differences in survey data can be the result of reliability problems or they can result from any of the following factors:

- o variations in the housing stock;
- o different time periods;
- o respondent characteristics;
- o different category definitions (i.e., wording, examples);
- o different sequencing of the categories;
- o positioning in the survey; and
- o the media or method of administration.

The reliability analysis was conducted in two parts. The first dealt with controlling for variations in respondent and dwelling characteristics. The focus was on the analysis of the consistency of responses of similar groups to the same question, both within individual survey samples and across samples. The results for the two questions were then compared for an overall assessment of reliability. The second part of the reliability analysis was based on analysing responses to different questions in matched samples and controlling for respondent characteristics so that the relative effects of the methods could be evaluated.

The data sources listed previously were reviewed for the consistency of responses to the two questions. For some key characteristics such as province or region, the breakdowns for the comparative responses to the need for repair categories had already been analysed and documented. For other characteristics such as income, mortgage status, education, length of tenure and household type further analysis was required.

The analysis of the consistency of responses within a particular sample required a large number of cases to support the selection of specific subgroups for comparison. Each of the four samples selected for in-depth study had sufficient cases for these analyses. Techniques included comparing frequency distributions, crosstabulations (with tests of significance) and variances for randomly split-halves of the sample.

# 3.0 RESULTS OF THE ANALYSIS

## 3.1 Overall Summary of Need For Repair Estimates

### 3.1.1 National Studies

Overall, estimates of need for repair vary significantly for the two questions in the major national surveys and the Census. The major difference, as we have already stated, is that the 1981 Census produced a much lower estimate of major repair need than the surveys using the HFE question. The three HFE surveys and the 1986 NHS produced very similar estimates of major repair need, varying from 10.1 per cent to 12.9 per cent, while the Census estimate was 6.5 per cent.

It is interesting to see that the Census and the three HFE surveys produced similar estimates of minor repair need (i.e., these varied from 13.9 per cent to 16.7 per cent), as well as estimates of no repair need. However the 1986 NHS, which uses the same question as the HFE surveys, has produced a much higher estimate of minor repair need (i.e., 23.9 per cent vs. approximately 13.9 to 16.0 per cent). These differences are presented in Exhibit 3.1.

It should be noted at the outset that the data from the 1981 Census and the HFE surveys reflect the weighted values, using the weights provided by Statistics Canada. The data for the 1986 NHS and 1987 NLHNA are unweighted, however, because the survey methods were designed to ensure representative samples. These methods and the quality and representativeness of the resulting data are discussed in detail in the reports for these two surveys.

**EXHIBIT 3.1**
**Overall Need for Repair Ratings -- National Studies**

| | Data Sources* | | | | |
|---|---|---|---|---|---|
| Need for Repair (%): | 1981 Census | 1982 HFE | 1985 HFE | 1987 HFE | 1986 NHS |
| Regular Maintenance | 76.8 | 72.1 | 73.6 | 73.3 | 66.1 |
| Minor Repairs | 16.7 | 15.0 | 13.9 | 16.0 | 23.9 |
| Major Repairs | 6.5 | 12.9 | 12.5 | 10.6 | 10.1 |
| unweighted n = | 117,832 | 35,595 | 34,262 | 30,841 | 11,062 |

* All sources used the HFE question with exception of the 1981 Census. Census and HFE results are based on weighted data. NHS results are based on unweighted data.

### 3.1.2 Newfoundland Studies

The results for the survey data for Newfoundland provide some very interesting results when compared to the national data. The data sources are the same as those presented in the previous exhibit with the addition of the 1987 NLHNA data. The patterns of the need for repair responses for the Newfoundland subsamples of the national studies are very similar to those of the full national samples (i.e., major repair need estimates are lower in the Census and minor repair need estimates are higher in the NHS). However, the 1987 NLHNA estimates based on the Census question are almost identical to the 1986 NHS results based on the HFE question.

The apparent underestimation of major repair need from the Census question does not occur in the Newfoundland survey. In fact the major repair need estimates for the Census question used in the 1987 survey (i.e., 13.1 per cent) are only slightly less than the estimates from the 1985 HFE survey (i.e., 15.5 per cent) and the 1986 NHS (17.0 per cent). The results for minor repair need in the 1987 Newfoundland survey are similar to the results from the 1986 NHS. In other words, the figures are almost double those from the 1985 HFE survey. These findings are presented in Exhibit 3.2.

**EXHIBIT 3.2**
**Overall Need for Repair Ratings for Newfoundland**

| | Data Sources* | | | |
|---|---|---|---|---|
| | Census Question | | HFE Question | |
| Need for Repair (%): | 1981 Census (NFLD) | 1987 NLHNA (NFLD) | 1985 HFE (NFLD) | 1986 NHS (NFLD) |
| Regular Maintenance | 77.0 | 62.2 | 69.2 | 62.0 |
| Minor Repair | 16.3 | 24.6 | 13.9 | 22.5 |
| Major Repair | 6.7 | 13.1 | 17.0 | 15.5 |
| unweighted n = | 2,787 | 1,989 | 1,820 | 503 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

This set of comparisons for the Newfoundland survey data give the first indication that the method of administration may be of much greater importance than the actual question in determining the estimates of repair need. The 1986 NHS and 1987 NLHNA, which used different questions, were based on almost identical methods. Furthermore, both were housing surveys, which the Census and HFE survey were not. This may have been a determining factor in the similarity of the results for all three repair need categories in these two surveys.

## 3.2 Construct Validity Tests of Need for Repair Data

In both the 1986 NHS and the 1987 NLHNA surveys inspectors provided need for repair ratings for a subsample of houses for which occupants provided ratings using the same questions (i.e., the Census question for the NLHNA and the HFE question for the NHS). These linked cases present the opportunity to conduct construct validity tests by comparing the occupant ratings to the inspector ratings.

In general, both the Census and HFE questions have resulted in occupant data with serious validity problems. The problem is that occupants seriously underestimate the need for repair for their dwellings. The magnitude of these errors varies somewhat in the two different surveys, particularly in the minor repair category. This has important implications for our validity analysis but the overall finding is that occupant data on its own is flawed. As we will show later, these occupant errors are systematic rather than random.

The comparisons between the ratings of homeowners and inspectors in the two surveys is presented in Exhibit 3.3. This exhibit shows both the provincial (i.e., Newfoundland) and national results for the 1986 NHS along with the 1987 NLHNA data. These results should be examined for the purpose of comparing homeowner and inspector ratings only. Both inspection subsamples are somewhat biased towards a housing stock in poorer condition and the overall repair need estimates are more severe than is actually the case in the general stock.

**EXHIBIT 3.3**
**1987 NLHNA and 1986 NHS Comparison of Homeowner and Inspector Ratings for Need for Repair**

| | Census Question | | HFE Question | | | |
|---|---|---|---|---|---|---|
| | NLHNA | | NHS (Newfoundland) | | NHS (National) | |
| | Homeowner | Inspector | Homeowner | Inspector | Homeowner | Inspector |
| Need for Repair (%): | | | | | | |
| Regular maintenance | 46.3 | 34.6 | 52.5 | 43.4 | 62.9 | 52.4 |
| Minor repairs | 26.1 | 25.5 | 24.2 | 14.1 | 23.6 | 27.3 |
| Major repairs | 27.7 | 39.9 | 23.2 | 42.4 | 13.5 | 20.3 |
| unweighted n = | 188 | 188 | 99 | 99 | 1662 | 1662 |

The figures presented in Exhibit 3.3 show that the extent of the homeowner errors (i.e., underestimation of repair need) for the three separate repair need categories are very similar for the 1987 NLHNA and the national results from the 1986 NHS. The

problem is more serious, particularly in the major repair category, for the Newfoundland results from the NHS. Given the smaller number of cases in this subsample and the wider confidence intervals, however, we do not believe that it is possible to say that it is the Census question used in the 1987 NLHNA that has produced more valid data than the HFE question used in the 1986 NHS.

Another approach to analysing the relative validity of the two data sources is to compare the proportion of occupant ratings for the three categories which correspond to the inspector ratings. Higher levels of correspondence can be interpreted as indicating more valid data and hence a more valid measure. Exhibit 3.4.A presents the percentage of cases in each of the data sources that show exact correspondence between the occupant and inspector ratings. The national NHS and NLHNA results are very similar with the Newfoundland results showing only slightly less agreement. We should note that the detailed results of the crosstabular analysis for both data sources, with the appropriate measures of association and statistical significance, are presented in Appendix A.

**EXHIBIT 3.4.A**
**Correspondence Between Occupant and Inspector Ratings**
**On Need for Repair Categories***

| | HFE Question | | Census Question |
|---|---|---|---|
| | NHS (National) | NHS (Nfld.) | NLHNA |
| Agreement | 56.6% | 47.5% | 53.7% |
| No Agreement | 43.4% | 52.5% | 46.3% |
| unweighted n = | 1662 | 99 | 188 |

* Complete agreement between occupant rating and inspector rating on all three categories.

Because the analysis of complete or exact agreement between the three categories was inconclusive, we examined the extent of partial agreement. The repair need categories were collapsed in two different ways: 1) by combining the major and minor repair categories and creating a repair need/no repair need dichotomy; and 2) by

combining the minor repair and no repair categories and creating a major repair/other dichotomy. The results of these analyses of agreement are presented in Exhibits 3.4.B and 3.4.C.

**EXHIBIT 3.4.B**
**Correspondence Between Occupant and Inspector Ratings On Repair/No Repair Categories***

| | HFE Question | | Census Question |
|---|---|---|---|
| | NHS (National) | NHS (Nfld.) | NLHNA |
| Agreement | 67.4% | 68.7% | 72.3% |
| No Agreement | 32.6% | 31.3% | 27.7% |
| unweighted n = | 1662 | 99 | 188 |

* Agreement between occupant and inspector ratings of repair (i.e., major or minor repairs) or no repairs (i.e., regular maintenance only).

**EXHIBIT 3.4.C**
**Correspondence Between Occupant and Inspector Ratings On Major Repair and Other Categories***

| | HFE Question | | Census Question |
|---|---|---|---|
| | NHS (National) | NHS (Nfld.) | NLHNA |
| Agreement | 80.4% | 62.6% | 71.8% |
| No Agreement | 19.6% | 37.4% | 28.2% |
| unweighted n = | 1662 | 99 | 188 |

* Agreement between occupant rating and inspector ratings of major repairs or other categories (i.e., minor repairs or regular maintenance).

For the repair/no repair dichotomy, there was virtually no difference between the two data sources, the NLHNA Census question results being only slightly more positive (i.e., 72.3 per cent of cases in agreement compared to approximately 68 per cent for the NHS). For the major repair/other dichotomy the differences are more

pronounced. The overall results for NHS (i.e., HFE question) show over 80 per cent of cases in agreement compared to 71.8 per cent for the NLHNA Census question). Unfortunately the agreement for the HFE question dropped to 62.6 per cent in the Newfoundland component of the NHS so again these results are not conclusive.

Further analyses of agreement of this type were conducted for high and low income groups. The tables showing the results are presented in Appendix B. The overall finding is that high income groups were better at rating the condition of their dwellings and the degree of correspondence of their ratings with those of the inspectors was much higher. Again the differences between data sources (and question types) were not major or conclusive, for either income group.

As a more formal test of the comparative validity of the data than examining the two sets of scores and the proportions of agreement, we conducted tests, based on crosstabulation, to measure the degree of association between the homeowner and inspector ratings. The results of these tests are presented in Exhibit 3.5. This exhibit shows a number of statistics including: Gamma, a measure of association ranging from -1 to +1; the per cent of cases with an exact correspondence in responses to the three categories; the per cent of cases where the homeowner made a serious error (i.e., rated no repair when the inspector rated major repair or vice versa); the direction of the occupant bias; and the per cent of homeowners who were correct for each of the three categories.

The results presented in Exhibit 3.5 reflect what has already been stated. The 1987 NLHNA and the national results from the 1986 NHS were very similar, with the 1987 survey (and the Census question) providing slightly better results because of better estimates in the major repair category. Although the overall degree of association between occupant and inspector ratings for the Newfoundland cases was similar to the national results, there were more serious (i.e., two category) errors, as well as problems in the minor repair category. Two category errors means that the inspector indicated major repairs and the occupant indicated regular maintenance only or vice versa. Appendices C.1 to C.5 show the percentage of two category errors.

**EXHIBIT 3.5**
**Summary -- Performance Indicators Demonstrating Quality of Responses to Need for Repair Question by Various Data Sources**

| | 1986 NHS | 1987 NLHNA | 1986 NHS (NFLD Only)* |
|---|---|---|---|
| Rater | Homeowner | Homeowner | Homeowner |
| Gamma | + .58 | + .67 | + .56 |
| % Exact Correspondence | 57 | 54 | 47 |
| % Serious Error | 9 | 10 | 16 |
| Direction of Bias | Underestimate | Underestimate | Underestimate |
| % Correct Regular Maintenance | 66 | 58 | 62 |
| % Correct Minor Repairs | 35 | 29 | 4 |
| % Correct Major Repairs | 52 | 71 | 61 |
| unweighted n | 1,662 | 188 | 99 |

* Note: In this survey there are few cases so percentages in the repair need categories vary a great deal and should be interpreted with caution because the confidence intervals will be extremely broad.

Further analyses of the extent of association between the occupant and inspector ratings with breakdowns by a number of key occupant characteristics were also conducted. These are presented in Appendix C. The tables are similar to Exhibit 3.5 but also show the breakdowns for subgroups by income, length of occupancy, size of dwelling, family type and mortgage status. There are a number of variations shown in these exhibits but the only major and conclusive finding is that ratings of high income homeowners are more valid than those of the lower income group. There is little in the way of conclusive evidence about a question type.

## 3.3 Analysis of Reliability

### 3.3.1 Comparison of Respondent Characteristics

A series of comparisons were made between the 1986 NHS and 1987 NLHNA data to assess the reliability of the two need for repair questions. Need for repair ratings were compared for respondents in different types of dwellings and from different socio-economic groups. As we have already stated it is very difficult to interpret the meaning of differences in ratings without an objective comparison (i.e. the inspector ratings) because there can be so many possible sources of variation.

Exhibit 3.6 presents the ratings of respondents to the questions with breakdowns by type of dwelling, household type and education. It also presents some comparative statistics for dwelling size, income and age of respondent for the three categories in each of the two surveys. A review of these findings shows that the two surveys produced very similar results for different types of respondents. In fact the consistency of the results are such that most differences in responses between the two surveys are not statistically significant. There are some larger differences for certain types of households (e.g., 49 per cent no repair for single parents from the Census question vs. 29 per cent from the HFE question) but the number of cases in these subgroups is small and the differences are not significant.

**EXHIBIT 3.6**
**Comparison of Homeowner Characteristics by Need for Repair**
**Responses: NLHNA and NHS (NFLD Only) Cases**

| | NLHNA | | | | NHS - NFLD | | | |
|---|---|---|---|---|---|---|---|---|
| | Regular Maintenance | Minor Repairs | Major Repairs | n | Regular Maintenance | Minor Repairs | Major Repairs | n* |
| **Type of Dwelling (%):** | | | | | | | | |
| Single detached | 63.9 | 23.6 | 12.5 | 1481 | 64.1 | 21.1 | 14.8 | 412 |
| Other | 59.1 | 24.8 | 16.1 | 137 | 60.0 | 20.0 | 20.0 | 35 |
| **Description of Household (%):** | | | | | | | | |
| One person alone | 57.6 | 28.8 | 13.6 | 59 | 53.3 | 20.0 | 26.7 | 15 |
| Single parent | 49.3 | 27.5 | 23.2 | 69 | 29.2 | 41.7 | 29.2 | 24 |
| Married, no children | 70.8 | 18.9 | 10.3 | 243 | 63.0 | 24.1 | 13.0 | 54 |
| Married, with children | 53.7 | 24.8 | 11.5 | 1086 | 66.0 | 19.4 | 14.5 | 324 |
| Two or more unrelated | 40.0 | 30.0 | 30.0 | 10 | 0.0 | 0.0 | 100.0 | 1 |
| Other | 56.3 | 20.7 | 23.0 | 87 | 61.9 | 19.0 | 19.0 | 21 |
| **Education of Respondent (%):** | | | | | | | | |
| High school or less | 57.9 | 26.0 | 16.1 | 951 | 62.4 | 18.4 | 19.1 | 282 |
| Some post secondary | 69.7 | 23.2 | 7.1 | 254 | 60.7 | 30.4 | 8.9 | 56 |
| College/university grad. | 73.8 | 19.1 | 7.1 | 366 | 65.6 | 24.7 | 9.7 | 93 |
| **Average Number of Rooms (x):** | 7.2 | 6.7 | 6.2 | 1613 | 7.0 | 6.6 | 6.2 | 455 |
| **Average Income ($\bar{x}$):** | $37,627 | $29,912 | $22,189 | 1389 | $36,411 | $29,066 | $21,161 | 370 |
| **Average Age of Respondent (x):** | 44.3 | 43.4 | 45.8 | 1572 | 42.7 | 42.1 | 45.8 | 442 |

* Note: For some of the breakdowns (e.g., some household types) there are very few cases and the percentages in the repair need categories should be interpreted with caution because the confidence intervals will be extremely broad.

n is unweighted

### 3.3.2 Variability in National Data

The overall patterns of differences between the three national samples in repair need ratings presented in Exhibit 3.7 are also reflected in the breakdowns by tenure. The 1981 Census has produced lower estimates of major repair need for both owners and renters. The 1986 NHS produced higher estimates of minor repair need and lower estimates of no repair need than either of the other two data sources. There is some convergence in the estimates from the Census and HFE survey of repair need for renters, but the general pattern of higher estimates of major repair need from the HFE question still holds for both renters and homeowners. The differences in no repair and minor repair need in the 1986 NHS and 1985 HFE are much greater for tenants than for owners, although the differences for both groups are still significant. Exhibit 3.7 presents the findings for repair need estimates by tenure.

**EXHIBIT 3.7**
**Need for Repair Variations by Tenure -- National Studies**

| | | Data Source* | | |
|---|---|---|---|---|
| | | 1981 Census | 1985 HFE | 1986 NHS |
| Regular Maintenance - | Owner | 72.2% | 74.0% | 69.2% |
| | Renter | 76.1% | 73.0% | 55.0% |
| Minor Repairs - | Owner | 16.7% | 12.5% | 21.4% |
| | Renter | 16.7% | 16.1% | 32.8% |
| Major Repairs - | Owner | 6.0% | 13.4% | 9.5% |
| | Renter | 7.3% | 10.9% | 12.2% |
| unweighted n = | | 117,832 | 34,262 | 11,062 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

Similar analyses of variations in need for repair ratings from the three samples were conducted by income and family type. Exhibit 3.8 presents the breakdowns by income. For this analysis, income was simply split in half or divided into two groups around the mean. Low income is the bottom 50 per cent of income; high income is the

top 50 per cent of income. It was not based on poverty levels or income thresholds. It is interesting that the differences in estimates of major repair need between the 1986 NHS and the 1985 HFE were more pronounced for the high income groups than for the overall samples. In fact the Census and NHS estimates for major repair from the high income groups are much more similar than in the two surveys using the same HFE question. For minor repairs there was little difference between the income groups in any of the samples. In general the variations in the estimates from different income groups in the NHS sample were wider than the variations in the HFE sample.

**EXHIBIT 3.8**
**Need for Repair Variations by Income -- National**

| | | Data Source* | | |
|---|---|---|---|---|
| | | 1981 Census | 1985 HFE | 1986 NHS |
| Regular Maintenance - | Low Income | 73.9% | 71.3% | 60.1% |
| | High Income | 79.7% | 76.0% | 71.1% |
| Minor Repairs - | Low Income | 17.8% | 14.8% | 25.7% |
| | High Income | 15.7% | 13.0% | 22.3% |
| Major Repairs - | Low Income | 8.4% | 13.9% | 13.4% |
| | High Income | 4.6% | 11.1% | 6.6% |
| unweighted n = | | 117,005 | 34,153 | 8,794 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

There was little variation in the need for repair estimates by family type in any of the three samples. These results are presented in Exhibit 3.9. Although some of these differences are statistically significant because of the large sample sizes, they are quite trivial.

**EXHIBIT 3.9**
**Need for Repair Variations by Family Type -- National**

| | | Data Sources* | | |
|---|---|---|---|---|
| | | 1981 Census | 1985 HFE | 1986 NHS |
| Regular Maintenance - | Family | 77.0% | 73.5% | 67.1% |
| | Non-Family | 76.0% | 74.2% | 64.9% |
| Minor Repairs - | Family | 16.7% | 13.7% | 23.2% |
| | Non-Family | 16.9% | 14.5% | 24.8% |
| Major Repairs - | Family | 6.3% | 12.9% | 9.7% |
| | Non-Family | 7.1% | 11.3% | 10.3% |
| unweighted n = | | 117,832 | 34,262 | 10,772 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

### 3.3.3 Variability in Data From Newfoundland

The analyses presented in the preceding section were repeated for the Newfoundland cases from the three national samples, with the addition of the 1987 NLHNA data. Need for repair estimates were compared with breakdowns by tenure, income and family type.

There was little variation in the repair need estimates for renters and owners in the 1981 Census and the 1985 HFE. However this was not the case for the two more recent surveys in which the minor and no repair estimates were significantly different by tenure. Again the differences are not consistent with changes in the question. These results are presented in Exhibit 3.10.

**EXHIBIT 3.10**
**Need for Repair Variations by Tenure -- Newfoundland**

| | | Data Source* | | | |
|---|---|---|---|---|---|
| | | 1981 Census | 1985 HFE | 1986 NHS | 1987 NLHNA |
| Regular Maintenance - | Owner | 77.1% | 69.0% | 63.5% | 63.5% |
| | Renter | 76.2% | 69.9% | 46.7% | 55.1% |
| Minor Repairs - | Owner | 16.4% | 13.3% | 21.2% | 23.7% |
| | Renter | 16.1% | 16.4% | 35.6% | 30.0% |
| Major Repairs - | Owner | 6.5% | 17.7% | 15.3% | 12.8% |
| | Renter | 7.7% | 13.7% | 17.8% | 14.9% |
| unweighted n = | | 2,787 | 1,820 | 503 | 1,944 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

Renter estimates of minor repair were higher than those of owners in both the NHS and NLHNA, and estimates of no repair were lower. Variation in the major repair estimates from owners and renters in all of the four samples was not large. With the exception of the 1985 HFE, renter estimates of major repair need were 1.2 percentage points (Census) to 2.5 percentage points (NHS) higher than the estimates of owners.

The variations in need for repair for different groups again show higher repair need for the lower income groups. What is perhaps most significant in the findings presented in Exhibit 3.11 is that the need for repair estimates from the NHS and NLHNA are very similar for both income groups across all three categories. The HFE and NHS again show differences in the minor repair and no repair categories, although the ratios of repair need for the two income groups are similar (e.g., the 15.2 per cent - 12.6 per cent ratio between income groups of minor repair need from the HFE is similar to the 25.1 per cent - 20.6 per cent ratio from the NHS).

**EXHIBIT 3.11**
**Need for Repair Variations by Income -- Newfoundland**

| | | Data Source* | | | |
|---|---|---|---|---|---|
| | | 1981 Census | 1985 HFE | 1986 NHS | 1987 NLHNA |
| Regular Maintenance - | Low Income | 73.2% | 62.6% | 51.3% | 52.5% |
| | High Income | 80.6% | 75.6% | 70.3% | 69.3% |
| Minor Repairs - | Low Income | 16.8% | 15.2% | 25.1% | 26.9% |
| | High Income | 15.9% | 12.6% | 20.6% | 22.9% |
| Majo. Repairs - | Low Income | 10.0% | 22.2% | 23.6% | 20.6% |
| | High Income | 3.5% | 11.8% | 9.1% | 7.8% |
| unweighted n = | | 2,766 | 1,817 | 408 | 1,669 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

The variations in estimates for different family types are presented in Exhibit 3.12. There is very little of significance in this table. Non-family households were in relatively greater repair need than family households. Also the variations in the ratings in the estimates are somewhat wider for the 1986 NHS than for the other samples.

**EXHIBIT 3.12**
**Need for Repair Variations by Family Type -- Newfoundland**

| | | Data Source* | | | |
|---|---|---|---|---|---|
| | | 1981 Census | 1985 HFE | 1986 NHS | 1987 NLHNA |
| Regular Maintenance - | Family | 77.4% | 69.6% | 64.6% | 62.2% |
| | Non-Family | 73.9% | 66.3% | 53.2% | 61.5% |
| Minor Repairs - | Family | 15.7% | 13.9% | 20.6% | 25.8% |
| | Non-Family | 20.5% | 13.7% | 27.3% | 23.5% |
| Major Repairs - | Family | 6.9% | 16.5% | 14.8% | 12.0% |
| | Non-Family | 5.6% | 20.0% | 19.4% | 14.9% |
| unweighted n = | | 2,787 | 1,820 | 484 | 1,869 |

* Census and HFE results are based on weighted data. Other results are based on unweighted data.

### 3.3.4 Provincial Variations in HFE Question Results

Earlier in this report we stated that the measurement errors in the need for repair estimates resulting from occupant data were systematic rather than random. Probably the most vivid evidence we can provide to support this conclusion is the following table comparing provincial differences in the ratings of homeowners and inspectors from the 1986 National Housing Survey. The results presented in Exhibit 3.13 are pertinent to both the issues of validity and reliability. The results show that in the four Western provinces and Ontario the occupant ratings are quite similar to the inspector ratings (i.e., they are valid). However in the Atlantic provinces, and to a lesser extent in Quebec, there is a wide divergence in the occupant and inspector ratings.

**EXHIBIT 3.13**
**1986 NHS -- Homeowner and Inspector Comparisons by Province**

| | NHS - Homeowner | | | | NHS - Inspectors | | | |
|---|---|---|---|---|---|---|---|---|
| Province (%): | Major Repairs | Minor Repairs | Regular Maintenance | n | Major Repairs | Minor Repairs | Regular Maintenance | n |
| British Columbia | 11.2 | 21.4 | 67.4 | 215 | 11.6 | 30.7 | 57.7 | 215 |
| Alberta | 9.0 | 23.1 | 67.8 | 199 | 14.1 | 44.2 | 41.7 | 199 |
| Saskatchewan | 7.0 | 32.2 | 60.9 | 115 | 11.3 | 9.6 | 79.1 | 115 |
| Manitoba | 14.0 | 24.0 | 62.0 | 100 | 13.0 | 24.0 | 63.0 | 100 |
| Ontario | 10.8 | 18.9 | 70.3 | 212 | 11.8 | 24.5 | 63.7 | 212 |
| Quebec | 10.5 | 25.3 | 64.2 | 372 | 15.3 | 29.6 | 55.1 | 372 |
| New Brunswick | 20.5 | 23.2 | 56.3 | 112 | 43.8 | 28.6 | 27.7 | 112 |
| Nova Scotia | 20.8 | 24.0 | 55.2 | 183 | 30.1 | 27.9 | 42.1 | 183 |
| Prince Edward Island | 27.3 | 20.0 | 52.7 | 55 | 54.5 | 10.9 | 34.5 | 55 |
| Newfoundland | 23.2 | 24.2 | 52.5 | 99 | 42.4 | 14.1 | 43.4 | 99 |
| Overall | 13.5 | 23.6 | 62.9 | 1,662 | 20.3 | 27.3 | 52.4 | 1,662 |

Note: n is unweighted

These results show that there is a serious problem with the comparability (i.e., reliability) of the need for repair data from the HFE question. The measure is not providing valid data in a consistent manner from across the country. Although we do not have the data to support a similar analysis for the estimates from the Census question, we do not believe that this systematic measurement error is the result of the HFE question.

# 4.0 SUMMARY AND CONCLUSIONS

## 4.1 Summary of Findings

The type of survey and the method of administration seem to have had much greater impacts on the estimates of repair need than the actual need for repair question used. For example, the estimates of major repair from the 1981 Census were much lower than the estimates from the various HFE surveys. These results initially led to the belief that the Census question produced a relatively poorer estimate of repair need than the HFE question. However, the estimates of repair need from the 1986 NHS and the 1987 NLHNA, which used the HFE question and Census question respectively, were very similar. These latter results were produced having controlled for the effects of type of survey, method of administration, survey population and sampling procedures.

Although the two questions produced relatively similar estimates of repair need when we controlled for a number of key factors, both questions resulted in underestimates of actual repair need. This important result was determined by comparing the occupant data with inspector ratings in comparable subsamples from surveys using the two questions. Furthermore, there appears to be systematic differences in the extent of this crucial bias in the physical house condition ratings. In other words, the extent of underestimation of repair need is relatively greater for some provinces than for others. In the 1986 NHS, occupant ratings were very similar to the comparable inspector ratings in the four western provinces and Ontario. However in the Atlantic provinces, and to a lesser extent in Quebec, the occupant ratings were far more positive than the inspector ratings.

Both questions produced more accurate estimates of repair need when the distinction between major and minor repairs was eliminated during the analysis. Approximately 50 per cent of respondents to both the 1986 NHS and the 1987 NLHNA provided ratings that matched the inspectors' ratings for all three categories. This percentage of accurate responses increased to approximately 70 per cent for these two surveys when the responses to the major and minor repair categories were collapsed.

Furthermore, these similarities and differences in the responses to the two questions were consistent for a number of key respondent characteristics such as tenure, size of dwelling, length of tenure and family type. Only for household income were there significant differences, with households in the top one-half of the sample in terms of income providing more accurate estimates of major repair need than those in the lower one-half of the sample. Estimates of minor repair need were relatively similar for different income groups in the surveys using the two different questions.

## 4.2 Conclusions

One of our basic conclusions is that there is little difference in the overall validity or reliability of the 1981 Census house condition question and the revised formulation of this question utilised in the HFE survey. Initial comparisons of the marginal distributions of the 1981 Census and 1985 HFE question suggested significant variations, particularly in the proportion of the stock classified in need of major repairs (6.5 per cent versus 12.5 per cent). However, there are a range of other factors which confound our ability to attribute this gap to differences in question wording. These include: possible changes in the stock between 1981 and 1985; sequencing and embedding effects (the HFE question was located in a different question series); question administration method; sampling variations (granted a small consideration).

Of all of the possible comparisons we conducted, the one which isolates the wording effects the best is the 1986 National Housing Study (Newfoundland sample) and the 1987 Newfoundland and Labrador Housing Corporation Study. Period effects are minimal, method of administration is identical, and sequencing and embedding of the questions are virtually identical. In this case the C ensus question yields 13.1 per cent major repair versus 15.5 per cent for the HFE-type question.

It is our conclusion from this, and several other comparisons and analyses, that the HFE-type question and Census-type question produce very similar results. The HFE-type seems to produce a somewhat higher incidence of major repair -- probably about three per cent more. In terms of reliability there is no clear evidence to support the view that either question is superior. In terms of the more important issue of validity there is little evidence to convince us that either question is significantly more

valid (when summed across all respondent types). Neither question is particularly valid at an individual household level. Occupants tend to be more forgiving in their ratings than inspectors. When aggregated for large groups, the correspondence in occupant and expert ratings is much greater. This is not terribly impressive when considering that in such a simple three category question there is a reasonable chance of concurrence through chance alone.

If we conclude that there is no compelling case to be made for the technical superiority of either question, then the decision must be made on other grounds. The question of intended application becomes quite crucial.

Suppose that stock *monitoring* and evaluation considerations are paramount. In this case, in the absence of convincing evidence of superiority of the HFE question, we would recommend retaining the original Census version. There may be some extremely minor improvements produced by the HFE-type wording, but this trivial gain in validity does not counterbalance the loss of semantically consistent comparison between the 1981 and 1991 stock.

# APPENDIX A

## APPENDIX A.1

## CROSSTABULATION OF NEED FOR REPAIR RESPONSES OF INSPECTORS AND HOMEOWNERS - NHS (NATIONAL)

| | Inspector | | | |
|---|---|---|---|---|
| Occupant | Regular Maintenance | Minor Repairs | Major Repairs | Row Total |
| Regular Maintenance | 687 | 250 | 108 | 1045<br>62.9 |
| Minor Repairs | 145 | 136 | 111 | 392<br>23.6 |
| Major Repairs | 39 | 68 | 118 | 225<br>13.5 |
| Column Total | 871<br>52.4 | 454<br>27.3 | 337<br>20.3 | 1662<br>100.0 |

Chi-square = 297.2 with 4 degrees of freedom. Significance < 0.00001
Gamma = +.58

## APPENDIX A.2

## CROSSTABULATION OF NEED FOR REPAIR RESPONSES OF INSPECTORS AND HOMEOWNERS - NHS (NEWFOUNDLAND)

| | Inspector | | | |
|---|---|---|---|---|
| Occupant | Regular Maintenance | Minor Repairs | Major Repairs | Row Total |
| Regular Maintenance | 32 | 8 | 12 | 52<br>52.5 |
| Minor Repair | 7 | 1 | 16 | 24<br>24.2 |
| Major Repair | 4 | 5 | 14 | 23<br>23.2 |
| Column Total | 43<br>43.4 | 14<br>14.1 | 42<br>42.4 | 99<br>100.0 |

Chi-square = 21.1 with 4 degrees of freedom, significance = 0.0003
Gamma = +.56

## APPENDIX A.3

## CROSSTABULATION OF NEED FOR REPAIR RESPONSES OF INSPECTORS AND HOMEOWNERS - NLHNA (NEWFOUNDLAND)

| | Inspector | | | |
|---|---|---|---|---|
| | Regular Maintenance | Minor Repairs | Major Repairs | Row Total |
| **Occupant** | | | | |
| Regular Maintenance | 50 | 21 | 16 | 87<br>46.3 |
| Minor Repair | 13 | 14 | 22 | 49<br>26.1 |
| Major Repair | 2 | 13 | 37 | 52<br>27.7 |
| Column Total | 65<br>34.6 | 48<br>25.5 | 75<br>39.9 | 188<br>100.0 |

Chi-square = 51.7 with 4 degrees of freedom. Significance < 0.00001
Gamma = +.67

# APPENDIX B

## APPENDIX B.1

## CORRESPONDENCE BETWEEN OCCUPANT AND INSPECTOR RATINGS ON NEED FOR REPAIR CATEGORIES BY INCOME*

| | NHS (National) | NLHNA | NHS (Nfld.) |
|---|---|---|---|
| **Low Income:** | | | |
| Agreement | 52.8% | 47.0% | 40.9% |
| No Agreement | 47.2% | 53.0% | 59.1% |
| n = | 744 | 83 | 44 |
| **High Income:** | | | |
| Agreement | 61.7% | 62.8% | 61.9% |
| No Agreement | 38.3% | 37.2% | 38.1% |
| n = | 768 | 86 | 42 |

* Complete agreement between occupant rating and inspector rating on all three categories.

## APPENDIX B.2

## CORRESPONDENCE BETWEEN OCCUPANT AND INSPECTOR RATINGS ON REPAIR/NO REPAIR CATEGORIES BY INCOME*

| | NHS (National) | NLHNA | NHS (Nfld.) |
|---|---|---|---|
| **Low Income:** | | | |
| Agreement | 67.9% | 71.1% | 72.7% |
| No Agreement | 32.1% | 28.9% | 27.3% |
| n = | 744 | 83 | 44 |
| **High Income:** | | | |
| Agreement | 67.6% | 75.6% | 69.0% |
| No Agreement | 32.4% | 24.4% | 31.0% |
| n = | 768 | 86 | 42 |

* Agreement between occupant and inspector ratings of repair (i.e., major or minor repairs) or no repairs (i.e., regular maintenance only).

## APPENDIX B.3

## CORRESPONDENCE BETWEEN OCCUPANT AND INSPECTOR RATINGS ON MAJOR REPAIR AND OTHER CATEGORIES BY INCOME*

| | NHS (National) | NLHNA | NHS (Nfld.) |
|---|---|---|---|
| **Low Income:** | | | |
| Agreement | 74.6% | 65.1% | 50.0% |
| No Agreement | 25.4% | 34.9% | 50.0% |
| n = | 744 | 83 | 44 |
| **High Income:** | | | |
| Agreement | 87.5% | 80.2% | 81.0% |
| No Agreement | 12.5% | 19.8% | 19.0% |
| n = | 768 | 86 | 42 |

* Agreement between occupant rating and inspector ratings of major repairs or other categories (i.e., minor repairs or regular maintenance).

# APPENDIX C

## APPENDIX C.1

## SUMMARY -- PERFORMANCE INDICATORS DEMONSTRATING QUALITY OF RESPONSES TO NEED FOR REPAIR QUESTION FOR VARIOUS DATA SOURCES BY INCOME LEVEL

| Survey | Rater | Gamma | % Exact Correspondence | % Serious Error | Direction of Bias | % Correct Regular Maintenance | % Correct Minor Repairs | % Correct Major Repairs |
|---|---|---|---|---|---|---|---|---|
| 1986 NHS | Upper Income Homeowner | +.53 | 62 | 7 | Underestimate | 70 | 38 | 38 |
| | Lower Income Homeowner | +.57 | 53 | 10 | Underestimate | 63 | 31 | 56 |
| 1987 NLHNA | Upper Income Homeowner | +.71 | 63 | 7 | Underestimate | 74 | 38 | 55 |
| | Lower Income Homeowner | +.54 | 47 | 11 | Underestimate | 31 | 26 | 74 |
| 1986 NHS NFLD only | Upper Income Homeowner | +.51 | 62 | 12 | Underestimate | 82 | 11 | 40 |
| | Lower Income Homeowner | +.39 | 41 | 18 | Underestimate | 44 | 0 | 65 |

## APPENDIX C.2

## SUMMARY -- PERFORMANCE INDICATORS DEMONSTRATING QUALITY OF RESPONSES TO NEED FOR REPAIR QUESTION FOR VARIOUS DATA SOURCES BY LENGTH OF TENURE

| Survey | Rater | Gamma | % Exact Correspondence | % Serious Error | Direction of Bias | % Correct Regular Maintenance | % Correct Minor Repairs | % Correct Major Repairs |
|---|---|---|---|---|---|---|---|---|
| 1986 NHS | 10 yrs or less - homeowner | +.60 | 58 | 8 | Underestimate | 68 | 36 | 47 |
| | Over 10 yrs - homeowner | +.57 | 55 | 10 | Underestimate | 63 | 32 | 58 |
| 1987 NLHNA | 10 yrs or less - homeowner | +.66 | 58 | 9 | Underestimate | 68 | 35 | 61 |
| | Over 10 yrs - homeowner | +.69 | 49 | 10 | Underestimate | 45 | 23 | 79 |
| 1986 NHS NFLD only | 10 yrs or less - homeowner | +.40 | 49 | 15 | Underestimate | 63 | 9 | 67 |
| | Over 10 yrs - homeowner | +.58 | 47 | 17 | Underestimate | 61 | 0 | 59 |

## APPENDIX C.3

## SUMMARY -- PERFORMANCE INDICATORS DEMONSTRATING QUALITY OF RESPONSES TO NEED FOR REPAIR QUESTION FOR VARIOUS SOURCES BY SIZE OF HOUSE*

| Survey | Rater | Gamma | % Exact Correspondence | % Serious Error | Direction of Bias | % Correct Regular Maintenance | % Correct Minor Repairs | % Correct Major Repairs |
|---|---|---|---|---|---|---|---|---|
| 1986 NHS | Small house - homeowner | +.57 | 54 | 9 | Underestimate | 64 | 31 | 58 |
| | Large house - homeowner | +.59 | 59 | 9 | Underestimate | 67 | 37 | 47 |
| 1987 NLHNA | Small house - homeowner | +.65 | 51 | 8 | Underestimate | 46 | 31 | 74 |
| | Large house - homeowner | +.60 | 57 | 11 | Underestimate | 66 | 24 | 64 |
| 1986 NHS NFLD only | Small house - homeowner | +.44 | 38 | 17 | Underestimate | 48 | 0 | 67 |
| | Large house - homeowner | +.63 | 56 | 16 | Underestimate | 70 | 11 | 55 |

* Small house is 1 to 6 rooms, large house is more than 6 rooms.

## APPENDIX C.4

## SUMMARY -- PERFORMANCE INDICATORS DEMONSTRATING QUALITY OF RESPONSES TO NEED FOR REPAIR QUESTION FOR VARIOUS DATA SOURCE BY FAMILY TYPE*

| Survey | Rater | Gamma | % Exact Correspondence | % Serious Error | Direction of Bias | % Correct Regular Maintenance | % Correct Minor Repairs | % Correct Major Repairs |
|---|---|---|---|---|---|---|---|---|
| 1986 NHS | Non-family - homeowner | +.59 | 58 | 9 | Underestimate | 67 | 36 | 51 |
| | Family - homeowner | +.58 | 57 | 9 | Underestimate | 65 | 34 | 54 |
| 1987 NLHNA | Non-family - homeowner | +.74 | 54 | 10 | Underestimate | 32 | 13 | 91 |
| | Family - homeowner | +.64 | 54 | 9 | Underestimate | 66 | 31 | 61 |
| 1986 NHS NLFD only | Non-family homeowner | +.38 | 35 | 12 | Underestimate | 67 | 0 | 40 |
| | Family - homeowner | +.57 | 53 | 17 | Underestimate | 61 | 7 | 67 |

* Family household is a married couple with children, non-family household is all others (i.e., single parents, individuals, etc.)

## APPENDIX C.5

## SUMMARY -- PERFORMANCE INDICATORS DEMONSTRATING QUALITY OF REPAIRS TO NEED FOR REPAIR QUESTION FOR VARIOUS DATA SOURCES BY PRESENCE OF MORTGAGE

| Survey | Rater | Gamma | % Exact Correspondence | % Serious Error | Direction of Bias | % Correct Regular Maintenance | % Correct Minor Repairs | % Correct Major Repairs |
|---|---|---|---|---|---|---|---|---|
| 1986 NHS | Homeowner with mortgage | +.61 | 58 | 8 | Underestimate | 66 | 39 | 53 |
| | Homeowner with no mortgage | +.57 | 56 | 10 | Underestimate | 66 | 26 | 51 |
| 1987 NLHNA | Homeowner with mortgage | +.64 | 51 | 12 | Underestimate | 54 | 25 | 71 |
| | Homeowner with no mortgage | +.74 | 59 | 6 | Underestimate | 64 | 35 | 71 |
| 1986 NHS NFLD only | Homeowner with mortgage | +.60 | 58 | 14 | Underestimate | 73 | 13 | 67 |
| | Homeowner with no mortgage | +.53 | 42 | 17 | Underestimate | 53 | 0 | 60 |

# APPENDIX D

## APPENDIX D.1
## EXAMPLE OF CENSUS QUESTION

1. Is this dwelling in need of any repairs? (Do not include desirable remodelling or additions.)

NO, ONLY REGULAR MAINTENANCE is needed (painting, furnace cleaning, etc.) ..... 1

YES, MINOR REPAIRS are needed (missing or loose floor tiles, bricks or shingles, defective steps, railings or siding, etc.) ..... 2

YES, MAJOR REPAIRS are needed (defective plumbing or electrical wiring, structural repairs to walls, floors or ceilings, etc.) ..... 3

**APPENDIX D.2**
**EXAMPLE OF HPE QUESTION**

**Is this dwelling in need of any repairs? Do not include desirable remodelling, additions, conversions of energy improvements.**

YES, MAJOR REPAIRS ARE NEEDED (to correct, for example, corroded pipes, damaged electrical wiring, sagging floors, bulging walls, damp walls and ceilings, crumbling foundation, rotting porches and steps) ..... 1

YES, MINOR REPAIRS ARE NEEDED (to correct, for example, small cracks in interior walls and ceilings, broken light fixtures and switches, leaking sink, cracked or broken window panes, some missing shingles or siding, some peeling paint) ..... 2

NO, ONLY REGULAR MAINTENANCE IS NEEDED (for example, painting, leaking faucets, clogged gutters or eavestrough) ..... 3